In the Claims

Please amend the correspondingly numbered claims as follows:

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1. (currently amended) A device, comprising:

a substrate;

a first fiber having a first end facet and fixed on said substrate;

a second fiber, fixed on said substrate and parallel to said first fiber, having a second end facet which opposes said first end facet with a gap to directly receive light from said first end facet without coupling optics therebetween; ~~and~~

a blade having a first blade surface facing said first end facet and forming ~~an~~ a first angle with respect to said first end facet and a second blade surface facing said second end facet and forming a second angle with respect to said first blade surface, said blade movably engaged to said substrate to move in and out of said gap at various positions to allow said blade to intercept a variable portion of the beam in said gap to adjust an amount of light directly coupled from said first fiber into said second fiber; and

an actuator built on the said substrate and engaged to said blade to adjust a position of said blade in said gap in response to a control signal.

2. (original) The device as in claim 1, wherein said blade is at least partially transparent.

3. (original) The device as in claim 1, wherein at least said first blade surface is optically reflective.

4. (original) The device as in claim 1, wherein said actuator sets an initial position of said blade at which said blade does not intercept the beam in said gap.

a13

5. (original) The device as in claim 1, wherein said actuator sets an initial position of said blade at which said blade completely intercepts the beam in said gap and prevents said beam from being coupled into said second fiber.

6. (original) The device as in claim 1, wherein said end facets of said first and said second fibers are substantially perpendicular to optical axes of said first and said second fiber which substantially coincide.

7. (original) The device as in claim 1, wherein said end facets of said first and said second fibers are coated with anti-reflective films.

8. (original) The device as in claim 1, wherein said end facets of said first and said second fibers form an angle with respect to optical axes of said first and said second fibers, respectively, and wherein said first fiber is spatially shifted from said second fiber to allow a maximum coupling efficiency from said first fiber to said second fiber when the blade does not intercept the light.

9. (currently amended) The device as in claim 1, ~~wherein~~ ~~said blade has a second blade surface facing said~~

~~second fiber,~~ said second blade surface being substantially ~~perpendicular~~ parallel to ~~said optical axis of~~ said second end facet ~~fiber~~.

10. (currently amended) The device as in Claim 1, wherein ~~said blade has a second blade surface facing said second fiber,~~ said second blade surface ~~which~~ forms ~~an~~ a third angle with respect to said second end facet ~~optic axis of said second fiber~~.

a13

11. (cancelled)

12. (original) The device as in claim 1, wherein said actuator is a rotational actuator, the device further comprising an arm having one end engaged to said actuator and an opposite end engaged to said blade, said arm amplifying a motion of said actuator to be a greater motion of said blade.

13. (original) The device as in claim 1, further comprising:

an optical coupler to split a fraction of light received by said second fiber from said second end facet to produce a monitor beam;

an optical detector to receive said monitor beam to produce a detector output;

a feedback circuit, coupled to said optical detector and said actuator to control a position of said blade to control an amount of light received by said second fiber in response to said detector output.

14. (original) The device as in claim 13, wherein said actuator is an electrostatic rotational comb device with a stationary part with a first set of stationary conductive teeth and a movable part with a first set of movable conductive teeth, said movable part movably engaged to said stationary part to have positions at which said movable teeth spatially interleave with said stationary conductive teeth to electrostatically interact to control movement of said movable part in response to a control voltage applied between said stationary conductive teeth and said movable conductive teeth.

a13

15. (original) The device as in claim 14, wherein said actuator includes a second set of movable conductive teeth in said movable part and a second set of stationary conductive teeth in said stationary part which spatially interleave with one another at said positions.

16. (original) The device as in claim 13, wherein said actuator includes an electro-magnetic actuator having a movable part with an electric coil and a stationary part with magnets to produce a magnetic field, said electric coil movable in said magnetic filed in response to a driving current.

17. (original) The device as in claim 13, wherein said actuator includes a movable part and a stationary part that are movable relative to each other by thermal expansion.

18. (original) The device as in claim 13, wherein said actuator includes a stationary part, a movable part movably engaged to said stationary part, and a piezo-electric

element engaged to move said movable part in response to a control signal.

19. (original) The device as in claim 13, wherein said feedback circuit controls said actuator to a bias position at which movement of said actuator is approximately linear with respect to a change in a control to said actuator.

a13

20. (original) The device as in claim 13, wherein said feedback circuit produces a bias signal to said actuator to set said actuator to a bias position at which said blade does not obstruct the light from being coupled from said first fiber to said second fiber.

21. (original) The device as in claim 13, wherein said feedback circuit produces a bias signal to said actuator to set said actuator to a bias position at which said blade totally obstructs the light from being coupled from said first fiber to said second fiber.

22. (original) The device as in claim 13, wherein said feedback circuit produces a bias signal to set said actuator to a bias position at which movement of said actuator is damped with respect to a change in said control signal to said actuator.

23. (original) The device as in claim 1, wherein said actuator includes two serpentine torsional hinges which define a rotational axis around which said actuator rotates said blade.

24. (original) The device as in claim 1, wherein said actuator includes two serpentine hinges.

25. (currently amended) A method, comprising:

causing end facets of two fibers to face each other with a gap;

a13

causing said gap to be at a value to allow for direct optical coupling between said two fibers without coupling optics there between to have an optical loss less than about 1dB; and

causing a blade to move in said gap to interfere with said direct optical coupling by optical refraction or reflection, wherein said blade has a first blade surface facing a first of the end facets at a first ~~an~~ angle with respect to an end facet of a fiber that outputs light to said blade surface, and wherein said blade has a second blade surface facing a second of the end facets and forming a second angle with respect to the first blade surface.

26. (currently amended) ~~The method as in claim 25,~~ A method, comprising:

causing end facets of two fibers to face each other with a gap;

causing said gap to be at a value to allow for direct optical coupling between said two fibers without coupling optics therebetween to have an optical loss less than about 1dB; and

causing a blade to move in said gap to interfere with said direct optical coupling by optical refraction or reflection, wherein said blade has a blade surface at an angle with respect to an end facet of a fiber that outputs light to said blade surface;

wherein said blade is engaged to a rotational actuator which has a set of stationary conductive teeth and a set of movable teeth interleaving with said stationary teeth, wherein said stationary and said movable teeth interact electrostatically to move said movable teeth in response to a potential difference, the method further comprising:

causing a bias in said potential difference to make said rotational actuator respond approximately linearly and with damping with respect to a change in said potential difference.

a13

27. (original) The method as in claim 25, further comprising:

causing a fraction of light coupled through said gap to be converted into an electrical signal indicative of an amount of light coupled through said gap; and

causing a position of said blade in said gap to be controlled according to said an amount of light to control said amount of light coupled through said gap.

28. (currently amended) A device, comprising:

a substrate;

a first fiber having a first end facet and fixed on said substrate;

a second fiber, fixed on said substrate and parallel to said first fiber, having a second end facet which opposes said first end facet by a gap to directly receive light from said first end facet without coupling optics therebetween;

a blade having a first blade surface facing said first end facet and forming ~~an~~ a first angle with respect to said first end facet and a second blade surface facing said

second end facet and forming a second angle with respect to said first blade surface, said blade movably engaged to said substrate to move in and out of said gap at various positions some of which allow said blade to intercept at least a portion of the beam in said gap to vary an amount of light directly coupled from said first fiber into said second fiber; and

a13

an actuator located on said substrate and engaged to said blade to control motion of said blade, wherein said actuator is an integrated micro mechanical device with a stationary part and a movable part with a first set of movable conductive teeth, said movable part movably engaged to said stationary part to have positions at which said movable teeth spatially interleave with said stationary conductive teeth to electrostatically interact to control movement of said movable part in response to a control voltage applied between said stationary conductive teeth and said movable conductive teeth.

29. (original) The device as in claim 28, wherein said gap is less than about 100 microns.

30. (original) The device as in claim 29, wherein said gap is between about 10 microns to about 50 microns.

31. (original) The device as in claim 28, wherein said substrate includes a groove in which said first and said second fibers are located, said groove having a protruded feature at a location of said gap and with a length along said groove to be equal to a desired spacing of said gap, and wherein said first and said second fibers are placed on opposite sides of said protruded feature to have said first

end facet and said second end facet positioned to contact said protruded feature.

32. (original) A method, comprising:

causing a layer of a selected material to be formed over a substrate surface;

a13

causing said layer to be processed to form a first pattern that selectively exposes and covers said substrate surface;

causing exposed areas on said substrate surface to be etched to a first depth;

causing a second substrate to be bonded to said patterned layer over said substrate surface;

causing said second substrate to be thinned to a desired thickness to form a thin layer;

causing a second layer of said selected material to be formed over a second substrate surface of said second substrate that is opposite to said surface bonded to said patterned layer;

causing said second layer to be processed to form a second pattern that selectively exposes and covers said second substrate surface, wherein selectively covered areas include a first group and a second group;

causing a photoresist mask layer to be formed over said second layer in only said first group to leave said second layer in said second group exposed;

causing exposed areas on said second substrate surface to be etched to a first depth without penetrating said thin layer to form first etched exposed areas;

causing said exposed second layer in said second group that is not covered by said photoresist mask layer to

be removed by a dielectric etching processing without etching exposed areas on said second substrate surface;

causing etching of exposed areas on said second substrate surface including said first etched exposed areas and areas of said second group that are above said first etched exposed areas on said second substrate surface;

a13 causing said etching to be stopped when said first etched exposed areas are etched through to make exposed areas in said second group thinner than said areas in said first group; and

causing said second layer covering said first group to be removed.

33. (original) The method as in claim 32, wherein said substrate material includes silicon and said selected material includes silicon oxide or silicon nitride.

34. (original) The method as in claim 32, wherein said substrate material includes a silicon-on-insulator.

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a. a first facet launching an optical beam;

b. a second facet separated from the first facet by a gap and positioned to receive the optical beam;

c. a blade extending through the gap and intersecting at least a portion of the beam, the blade including:

i. a first blade surface facing the first facet; and

ii. a second blade surface facing the second facet;

iii. wherein the first and second blade surfaces are nonparallel;

d. an electromechanical actuator connected to the blade and adjusting the blade within the gap in response to control signals; and

e. a control circuit electrically connected to the actuator and generating the control signals.

Cont A14

36. (new) The attenuator of claim 35, wherein the blade attenuates the beam by refraction.

37. (new) The attenuator of claim 35, wherein the control circuit electrically biases the control signals to place the electro-mechanical actuator in a linear response range when intersecting the portion of the optical beam.

38. (new) The attenuator of claim 37, wherein the actuator comprises a plurality of movable teeth, connected to the blade, and a plurality of stationary teeth.

39. (new) The attenuator of claim 38, wherein the actuator is a rotational actuator.

40. (new) The attenuator of claim 35, wherein the control circuit produces a bias signal setting the actuator to a bias position at which movement of the actuator is damped with respect to a change in the control signals.

41. (new) The attenuator of claim 35, wherein the electromechanical actuator is an electro-magnetic actuator.

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42. (new) An attenuator comprising:
   a. a first facet launching a beam;
   b. a second facet separated from the first facet by a gap and receiving the beam;
   c. a blade extending through the gap and intersecting at least a portion of the beam, the blade attenuating the portion of the beam by refraction;
   d. an electromechanical actuator connected to the blade and adjusting the blade within the gap in response to control signals; and
   e. a control circuit electrically connected to the actuator and generating the control signals.

43. (new) The attenuator of claim 42, wherein the control circuit electrically biases the control signals to place the electro-mechanical actuator in a linear response range when intersecting the portion of the optical beam.

44. (new) The attenuator of claim 42, wherein the actuator comprises a plurality of movable teeth, connected to the blade, and a plurality of stationary teeth.

45. (new) The attenuator of claim 44, wherein the actuator is a rotational actuator.

46. (new) The attenuator of claim 42, wherein the control circuit produces a bias signal setting the actuator to a bias position at which movement of the actuator is damped with respect to a change in the control signals.

a14

47. (new) The attenuator of claim 42, the blade including a first blade surface facing the first facet and a second blade surface facing the second facet, wherein the first and second blade surfaces are nonparallel.

48. (new) The attenuator of claim 42, wherein the blade is transparent.

49. (new) The attenuator of claim 42, wherein the electromechanical actuator is an electro-magnetic actuator.

50. (new) An attenuator comprising:
   a. a first facet launching a beam;
   b. a second facet separated from the first facet by a gap and positioned to receive the beam;
   c. a blade extending through the gap and intersecting a portion of the beam;
   d. an electromechanical actuator connected to the blade and adjusting the blade within the gap in response to control signals; and
   e. a control circuit electrically connected to the actuator and generating the control signals;

f. wherein the control circuit electrically biases the control signals to place the electro-mechanical actuator in a linear response range when intersecting the portion of the optical beam.

51. (new) The variable attenuator of claim 50, wherein the blade attenuates the portion of the beam by refraction.

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52. (new) The variable attenuator of claim 50, the blade comprising a first blade surface facing the first facet and a second blade surface facing the second facet, wherein the first and second blade surfaces are nonparallel.

53. (new) The attenuator of claim 50, wherein the electromechanical actuator is an electro-magnetic actuator.

54. (new) An attenuator comprising:
   a. a substrate;
   b. a first facet connected to the substrate and launching a beam in a first direction substantially parallel to the substrate;
   c. a second facet connected to the substrate, the second facet separated from the first facet by a gap and positioned to receive the beam;
   d. a blade extending through the gap and intersecting a portion of the beam, the blade including a first blade surface reflecting

some of the portion of the beam in a second direction substantially parallel to the substrate; and

e. an electromechanical actuator connected to the blade and adjusting the blade within the gap.

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55. (new) The variable attenuator of claim 54, wherein the first surface is substantially planar.

56. (new) The variable attenuator of claim 55, wherein the planar first surface defines a plane substantially normal to the substrate.

57. (new) The variable attenuator of claim 54, wherein the electromechanical actuator has a rotational axis, and wherein the first blade surface deflects the portion of the beam away from the rotational axis.

58. (new) The variable attenuator of claim 54, the blade further including a second blade surface opposite the first blade surface and passing a second portion of the beam.

59. (new) The variable attenuator of claim 58, wherein the first and second blade surfaces are nonparallel.

60. (new) The variable attenuator of claim 54, wherein at least one of the first and second facets is an end facet of an optical fiber.